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NOTICE OF ALLOWANCE AND FEE(S) DUE

20995

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12/03/2009

KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 EXAMINER

KOSSON, ROSANNE

ART UNIT PAPER NUMBER

1652 DATE MAILED: 12/03/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,894	07/21/2006	Francis Sean Moolman	ADADA4.001APC	5369

TITLE OF INVENTION: STABILIZATION OF ENZYMES IN AN EMULSION BY CROSS-LINKING

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	03/03/2010

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FOURTEENTH FLOOR IRVINE, CA 92614			1652	
IN VIINE, CA 9201	1		DATE MAILED: 12/03/2009	

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 427 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 427 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 (571)-272-4200.

	Application No.	Applicant(s)			
	 10/586,894	MOOLMAN ET AL.			
Notice of Allowability	Examiner	Art Unit			
	Rosanne Kosson	1652			
	Nosalille Nossoli	1032			
The MAILING DATE of this communication appeal all claims being allowable, PROSECUTION ON THE MERITS IS herewith (or previously mailed), a Notice of Allowance (PTOL-85) NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RI	(OR REMAINS) CLOSED or other appropriate comm GHTS. This application is	n this application. If not included unication will be mailed in due course. THIS			
1. This communication is responsive to <u>9/29/09</u> .					
2. X The allowed claim(s) is/are <u>1-8,11,13-19,30 and 31</u> .					
 3. Acknowledgment is made of a claim for foreign priority ur a) All b) Some* c) None of the: 1. Certified copies of the priority documents have 		or (f).			
2. Certified copies of the priority documents have	been received in Applicati	on No			
3. Copies of the certified copies of the priority documents have been received in this national stage application from the					
International Bureau (PCT Rule 17.2(a)).					
* Certified copies not received:					
Applicant has THREE MONTHS FROM THE "MAILING DATE" noted below. Failure to timely comply will result in ABANDONN THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.		e a reply complying with the requirements			
4. A SUBSTITUTE OATH OR DECLARATION must be subm INFORMAL PATENT APPLICATION (PTO-152) which give					
5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.					
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached					
1) ☐ hereto or 2) ☐ to Paper No./Mail Date	•				
(b) ☐ including changes required by the attached Examiner's Paper No./Mail Date	s Amendment / Comment o	or in the Office action of			
Identifying indicia such as the application number (see 37 CFR 1 each sheet. Replacement sheet(s) should be labeled as such in t					
6. DEPOSIT OF and/or INFORMATION about the depo attached Examiner's comment regarding REQUIREMENT					
Attachment(s) 1. ☐ Notice of References Cited (PTO-892)	5. ☐ Notice of I	nformal Patent Application			
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)		Summary (PTO-413),			
3. ☐ Information Disclosure Statements (PTO/SB/08),	Paper No	./Mail Date s Amendment/Comment			
Paper No./Mail Date 4. ☐ Examiner's Comment Regarding Requirement for Deposit	8. 🛛 Examiner's	s Statement of Reasons for Allowance			
of Biological Material	9.				

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Applicants' representative, Mr. Raymond Smith, on November 13, 2009.

The application has been amended as follows. The claims are amended as follows. Claims 3 and 18 have been rejoined.

- 1. (currently amended) A process for producing enzyme particles comprising:
- (a) providing an emulsion of droplets of a first liquid phase dispersed in a second liquid phase, with the one liquid phase being a hydrophilic phase and the other liquid phase being a hydrophobic phase which is immiscible with the hydrophilic phase, and with enzyme molecules being located at or within interfacial boundaries of the droplets and the second liquid phase;

adding a cross-linking agent to the hydrophilic phase and/or to the hydrophobic phase and/or to the emulsion,

(b) adding a temporary protectant to the hydrophilic phase and/or to the hydrophobic phase and/or to the emulsion, wherein the temporary protectant occupies active sites of the enzyme, thereby inhibiting occupation of the active sites by a cross-linking agent or reaction of a cross-linking agent with the active sites;

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(c) adding a cross-linking agent to the hydrophilic phase and/or to the hydrophobic phase and/or to the emulsion;

- (d) cross-linking, by means of the cross-linking agent, the enzyme molecules of the respective droplets, wherein the temporary protectant occupies active sites of the enzyme during the cross-linking, thereby inhibiting occupation of, or reaction with, the active sites by the cross-linking agent, with individual stabilized enzyme particles in which the enzymes molecules are immobilized with a majority of active sites of the enzyme molecules being orientated either towards the lumens of the particles or outwardly therefrom being formed from individual droplets; and
- (e) recovering the individual enzyme particles from the second liquid phase.
- 2. (previously presented) The process according to claim 1, wherein the individual particles have openings so that the liquid phases can pass in or out of the particles.
- 3. (withdrawn original) The process according to claim 1, wherein individual particles are liquid impervious.
- 4. (currently amended) The process according to claim 1, further comprising adding to the hydrophilic phase and/or to the hydrophobic phase and/or to the emulsion, a modifier for modifying the hydrophobicity and/or charge of the enzyme, wherein the modifier is selected from the group consisting of an amino acid, a protein and a long chain hydrocarbon aldehyde.

 (i) a precipitator for precipitating the enzyme onto the emulsion interfaces, (ii) an additive for modifying the pH, ionic strength, viscosity, magnetic properties, agglomeration tendency and/or zeta potential of the emulsion and/or the enzyme particles and (iii) a surfactant.

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5. (previously presented) The process according to claim 1, wherein the enzyme is

a lipase.

6. (previously presented) The process according to claim 5, wherein the lipase is

selected from the group consisting of Pseudomonas cepacia lipase, Pseudomonas fluorescens

lipase, Pseudomonas alcaligenes lipase, Candida rugosa lipase, Candida antarctica lipase A,

Candida antarctica lipase B, Candida utilis lipase, Thermomyces lanuginosus lipase,

Rhizomucor miehei lipase, Aspergillus niger lipase, Aspergillus oryzae lipase, Penicillium sp.

lipase, Mucor javanicus lipase, Mucor miehei lipase, Rhizopus arrhizus lipase, Rhizopus

delemer lipase, Rhizopus japonicus lipase, Rhizopus niveus lipase, and Porcine Pancreatic

lipase.

7. (previously presented) The process according to Claim 5, wherein the provision

of the emulsion is effected by dissolving the enzyme in the hydrophilic or water (W) phase and

forming the emulsion by mixing the enzyme containing hydrophilic phase with the hydrophobic

or oil (O) phase.

8. (previously presented) The process according to claim 7, further comprising selectively

precipitating the enzyme at the interface when the emulsion is an oil/water (O/W) emulsion in

which hydrophobic phase droplets are dispersed in a continuous hydrophilic phase, or within the

droplet volume, when the emulsion is a water/oil (W/O) emulsion in which hydrophilic phase

droplets are dispersed in a continuous hydrophobic phase.

9. (canceled)

10. (canceled)

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11. (previously presented) The process according to claim 7, further comprising adding an amino acid to the emulsion to inhibit agglomeration of the individual enzyme particles.

12. (canceled)

- 13. (previously presented) The process according to claim 7, further comprising extracting the first liquid phase from the enzyme particles.
- 14. (previously presented) The process according to claim 7, wherein the hydrophilic phase comprises water.
- 15. (previously presented) The process according to claim 7, wherein the hydrophilic phase comprises a polyethylene glycol.
- 16. (previously presented) The process according Claim 7, wherein the hydrophobic phase comprises an oil, a hydrocarbon, an ether, or an ester.
- 17. (currently amended) The process according claim 7, wherein the emulsion is a W/O emulsion in which hydrophilic phase droplets are dispersed in a continuous hydrophobic phase, with a second enzyme, a cofactor and/or a reaction mediator being present in the hydrophilic phase.
- 18. (withdrawn currently amended) The process according to Claim 5, wherein a triglyceride, which is hydrolysable by lipase, is used as the hydrophobic phase in [[, with]] an O/W emulsion, in which hydrophobic phase droplets are dispersed in a continuous hydrophilic phase, being formed and with the dispersed hydrophobic phase contained within the cross-linked particles

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being and wherein the triglyceride is hydrolyzed by the lipase during and after the cross-linking reaction.

19. (previously presented) The process according to claim 7, wherein said process comprises, prior to cross-linking, (1) the formation of an initial emulsion, in which hydrophobic phase droplets are dispersed in a continuous hydrophilic phase, (2) centrifugation of the emulsion and separation of a concentrated emulsion from a dilute hydrophilic phase, to increase lipase purity and (3) the inversion of the emulsion to form a n emulsion in which hydrophilic phase droplets are dispersed in a continuous hydrophobic phase, by the addition of a surfactant with a lower hydrophilic-lipophilic balance (HLB) value.

20 - 29. (canceled)

- 30. (previously presented) The process according to Claim 14, wherein the hydrophilic phase further comprises a buffer in the water.
- 31. (previously presented) The process according to Claim 15, wherein the hydrophilic phase further comprises water admixed with the polyethylene glycol.

The following is an examiner's statement of reasons for allowance. The prior art does not teach or suggest the claimed method. As previously discussed, Goldberg et al. (US 4,671,954) disclose a method of making a controlled-release drug delivery vehicle that is a W/O (water-in-oil) emulsion comprising porous particles. The composition is made by making an aqueous solution of a protein, such as an enzyme, and dispersing the water phase in the oil phase with the aid of a modifier, polyglutamic acid. Any suitable protein or polypeptide, such as

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an enzyme, may be used in this method. The polyglutamic acid modifies (reduces) the hydrophobicity and increases the hydrophilicity and the surface charge of the particles. Increased surface charge, with each particle having the same negative surface charge, reduces the aggregation of the particles. The hydrophilic phase comprises water mixed with, i.a., polyethylene glycol, a dispersion-stabilizing polymer, in the form of a block copolymer of polyethylene glycol and polypropylene glycol. The hydrophilic/aqueous phase may comprise additional molecules, polypeptides or macromolecules. Thus, the aqueous phase may comprise a second enzyme. The oil phase can be a hydrocarbon, such as toluene. This method includes the step of cross-linking the protein molecules in the microspheres with an agent such as glutaraldehyde. See col. 2, line 20, to col. 3, line 54; col. 4, lines 4-33; col. 5, lines 1-27; col. 11, lines 13-25 and col. 31, lines 17-35. The enzyme particles are recovered from the second liquid phase (see col. 6, lines 24-25). The first liquid phase (the aqueous phase) is extracted by drying the particles (see Examples 1, 21 and 25 in cols. 6, 15 and 16). The specification discloses that the step of extracting the agueous phase is carried out in one of several ways, such as drying (see p. 5, last paragraph). But the prior art, including Goldberg et al. does not disclose that, before the cross-linking reaction, the enzyme is contacted with a "temporary protectant," i.e., a reversible catalytic site blocker or inhibitor, to protect the catalytic site during the cross-linking reaction.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosanne Kosson whose telephone number is (571)272-2923. The examiner can normally be reached on Mon., Thurs., Fri., 8:30-6:00, Tues., 8:30-2:00, Wed. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang, can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rosanne Kosson Examiner, Art Unit 1652 rk/2009-11-23

/Karen Cochrane Carlson/ Primary Examiner, Art Unit 1656